Embryonic & Fetal Development

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South Carolina Department of Health and Environmental Control

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Meeting the requirements of the SC Womens Right to Know Act

"Embryonic & Fetal Development" is one of two documents available to you as part of the Women's Right to Know Act (SC Code of Laws: 44-41-330). If you would like a copy of the other document, "The South Carolina Directory of Services for Women, Children & Families," please complete the order form at the end of this publication. These materials are also available on the South Carolina Department of Health and Environmental Control's web site.

If you are thinking about terminating a pregnancy, the law says that you must certify to your physician or his/her agent that you have had the opportunity to review the information presented here at least 24 hours before terminating the pregnancy. Your physician or his/her agent should provide a certification statement for you to sign, date, and indicate the time. You must give this signed certification statement to your attending physician or his/her agent. If you would like additional information about these publications, please contact the DHEC Care Line at 1-800-868-0404.

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EMBRYONIC & FETAL DEVELOPMENT

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I. Understanding Gestational Age

What is Gestational Age?

You've probably heard people say that a pregnancy typically lasts about nine months (or 38 weeks).

But in the U.S., healthcare professionals typically calculate the length of a pregnancy by gestational age. Gestational age is the number of weeks that have passed since a woman's last normal menstrual period.

Especially in the early states of pregnancy, a physician can confirm the gestational age of your pregnancy through a physical exam.

What is Conceptional Age?

Gestational age is not the same thing as conceptional age. Conceptional age is how much time has passed since actual conception[1] (fertilization). Conception cannot take place until you ovulate, and that typically happens about 14 days after the start of your monthly period.

So conceptional age will always be about 14 days younger than gestational age. The average length of a full-term pregnancy is about 280 days, or 40 gestational weeks from the first day of the last period. The average length of a pregnancy from the time of conception is about 266 days, or 38 conceptional weeks from the day of conception.

Under South Carolina's abortion law, the first trimester is defined by conceptional age.

How to Calculate Gestational Age

1. Find the date of the first day of your last menstrual period on a calendar.

2. Count the number of weeks that you have passed starting with the date of the first day of your last normal period until today's date. For example, if your last menstrual period started on July 1st and today's date is August 1st, the gestational age is 4 weeks.

Another Way to Know Gestational Age: Ultrasound

Your doctor can also use ultrasound to figure out the estimated due date. Ultrasound is a painless technique used by healthcare professionals to create an image of internal body parts or monitor a pregnancy. The image is created from high frequency sound waves.

Ultrasound uses the size of the fetus to determine the gestational age (the time that has passed since the first day of your last period).

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You Can Request to See an Ultrasound

If you are pregnant and considering an abortion, the physician who will perform the procedure may do an ultrasound to confirm gestational age. If an ultrasound is performed, you have the right to view the ultrasound image if you so choose. In fact, by law, the physician or the physician's assistant must ask you if you want to view the image. But viewing the image is not required.

Some centers do not perform abortions but do offer free ultrasounds to females who are pregnant and considering abortion.

If you do decide to receive an ultrasound and to seek an abortion, be aware that there is a required 1 hour wait time between getting an ultrasound and terminating a pregnancy (except when medically necessary).

[1]Section 44-41-10 of the South Carolina Code of Laws defines 'conception' as "the fecundation of the ovum by the spermatozoa."

II. Role of Genetics

Every human is born with 46 chromosomes - thread-like structures that carry the genetic instructions that over time develop a one-celled embryo into a 100 trillion-cell human adult.

Each person inherits 23 chromosomes from their biological mother and 23 chromosomes from their biological father.

Genetically, we are very similar to other life forms and 99.9 percent identical to 6 billion other humans on the planet. But that seemingly small variation in our genetic makeup - the 0.1 percent - can have dramatic consequences on physical and mental health and appearance. Some researchers have even suggested that genetics play a role in our personalities.

One important thing you can do for your health and your family's health is to collect your family health history. Knowing what diseases have affected your blood relatives can help your healthcare provider gauge your risk for certain diseases and suggest ways to reduce that risk.

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III. Stages of Pregnancy by Two Week Intervals

Now that you know the gestational age of your pregnancy and have read the statement on genetics, you can, if you like, review a brief description of embryonic or fetal development for gestational age. However, this is not required.

If you decide to terminate your pregnancy, the physician or physician's assistant at the clinic or hospital will ask you to sign a statement verifying that you were given the opportunity to review this information on embryonic and fetal development at least 1 hour in advance of pregnancy termination.

Below, we have listed each two-week period under the appropriate trimester (as defined under South Carolina's abortion law). Each two-week period is identified two ways:

> By *gestational age* (the length of time that has passed since the first day of your last menstrual period)
>
> By *conceptional age* (the length of time that has passed since actual conception. Conceptional age will always be about two weeks younger than gestational age. Under South Carolina's abortion laws, trimesters are defined by conceptional age.)

First Trimester

0-2 Weeks from Conception
(3-4 Weeks after the last menstrual period)

The egg is released from the ovary. It is fertilized in the fallopian tube by the sperm. The fertilized egg starts to divide and forms a ball of cells. The ball of cells digs into the lining of the uterus.

- The ball of cells begins to form layers and fluid-filled spaces.
- The earliest part of the afterbirth begins to form.
- At this point in its growth, the ball of cells is called an "embryo".
- The embryo grows to a length of 0.2 mm (about 1/100 inch).

3-4 Weeks from Conception
(5-6 Weeks after the last menstrual period)

The embryo changes from a flat disc to a curved, C-shaped form. Organs begin forming. At this point, the menstrual period is missed.

- A tube forms along the embryo's length. This will grow into the brain and spinal cord.
- The heart starts as a tube, which begins to beat as it grows.
- Simple structures form on the sides of the head. They will become eyes and ears as time goes on.
- Limb buds, which look like bumps, start to form. Later they will become arms and legs.
- The embryo grows to a length of 6 mm (about ¼ inch).

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5-6 Weeks from Conception (7-8 Weeks after the last menstrual period)

About half of the embryo's length is the head, due to the rapid growth of the brain. The heart starts to form the normal four chambers. A heartbeat can be seen on ultrasound.

- The eyes and ears move toward their normal places on the head.
- Kidneys begin to form.
- "Rays" appear in the limbs, which will later form fingers and toes.
- The umbilical cord joins the embryo and the placenta (or afterbirth).
- The embryo is about 14 mm (1/2 inch) long.7-8 Weeks after Conception (9-10 Weeks after the last menstrual period)

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The embryo changes shape as the face forms. It begins to straighten out from its C-shape. The small tail bud begins to go away. The basic parts of the brain and the heart are now formed. There are fingers on the hands. The toes are almost formed.

- There are eyelids over the eyes, but they cannot open yet.
- Nipples can be seen and the first hair buds form.
- Muscles begin to form. Early bones are formed. The arms can bend at the elbow.
- The intestines grow rapidly.
- The embryo is about 31 mm (1-¼ inches) long.

9-10 Weeks after Conception (11-12 Weeks after the last menstrual period)

By this time, all the main body parts are formed and present. The embryo now is called a "fetus". Growth becomes most important. Fetal length is measured from the top of the head to the curve of the rump (crown-rump) length.

- The ears move up from around the neck to their normal position.
- Fetal movements and heartbeat can be seen on ultrasound.
- Various glands begin to work.
- The kidneys make urine.
- The crown-rump length is 61 mm (about 2-1/3 inches).
- The fetus weighs 14 grams (under one ounce).

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11-12 Weeks after Conception
(13-14 Weeks after the last menstrual period)

At this point, the sex of the fetus can be seen. The fetus begins to swallow fluid from the amniotic sac (bag of waters). The fluid is replaced with urine made by the kidneys.

- Blood cells are made in the bone marrow.
- The neck can be clearly seen between the head and body.
- The crown-rump length is 86 mm (about 3-½ inches).
- The fetus weighs 45 grams (about an ounce and a half).

Second Trimester

13-14 Weeks after Conception
(15-16 Weeks after the last menstrual period)

The fetal head is still large as the body straightens out. Its arms and legs are formed. They can move and bend.

- Sex organs are almost fully formed.
- Toenail and fingernail growth begins.
- The eyes move forward. The ears reach normal position. Now the face is well formed.
- The crown-rump length is 120 mm (about 4-¾ inches).
- The fetus weighs 110 grams (about 4 ounces).

15-16 Weeks after Conception
(17-18 Weeks after the last menstrual period)

Some women begin to feel the first fetal movements, called "quickening." Growth begins to speed up. The legs grow longer, so the fetal head seems less large. Slow fetal eye movements can be seen by ultrasound.

- The bones gain calcium at a rapid rate.
- The ears stand out from the head.
- The crown-rump length reaches 140 mm (about 5-½ inches).
- The fetus weighs 200 grams (about 7 ounces).

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17-18 Weeks after Conception
(19-20 Weeks after the last menstrual period)

Many women feel quickening by this time in pregnancy. The fetal skin is covered by something called "vernix caseosa". Vernix caseosa looks a little like cream cheese. This is about the halfway point of a normal pregnancy.

- A very fine hair called "lanugo" covers the fetal body.
- The crown-rump length is 160 mm (about 6-1/4 inches).
- The fetus weighs 320 grams (about 7 ounces).

19-20 Weeks after Conception
(21-22 Weeks after the last menstrual period)

The skin is red and wrinkled. Blood vessels can be seen very clearly beneath it.

- Eyebrow and eyelashes start to form.
- Fingerprints begin to form.
- The crown-rump length is 190 mm (about 7-3/4 inches).
- The fetus weighs 460 grams (just over a pound).

21-22 Weeks after Conception
(23-24 Weeks after the last menstrual period)

Fetal weight gain is fast during this time. Rapid eye movements can be seen by ultrasound.

- Lung growth reaches the point where some gas exchanges sacs are formed.
- The crown-rump length is 210 mm (about 8-1/2 inches).
- The fetus weighs 630 grams (1 pound, 6 ounces).
- At this time, there is a chance the fetus may live if delivered.

23-24 Weeks after Conception
(25-26 Weeks after the last menstrual period)

The lungs keep growing. The lung cells begin to make a chemical called "surfactant." Large amounts of surfactant are needed to keep the lungs open between breaths after birth.

- The fetus can suck on fingers or hands.
- The fetus will blink and act startled in response to loud noises near the woman's belly.
- The crown-rump length reaches 230 mm (about 9 inches).
- The fetus weighs 820 grams (a little less than 2 pounds).

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Third Trimester

25-26 Weeks after Conception
(27-28 Weeks after the last menstrual period)

The lungs keep growing. The fetus keeps gaining weight. The brain grows and starts to do more complex tasks.

- The eyelids are not fused. Fetal eyes will open slightly.
- Eyelashes are formed.
- The crown-rump length reaches 250 mm (about 10 inches).
- The fetus weighs 1000 grams (about 2 pounds and 3 ounces).

27-28 Weeks after Conception
(29-30 Weeks after the last menstrual period)

The fetal brain can now control body temperature and direct regular breathing. The fetus can weakly grasp at things. Different growth rates from one fetus to another become clear. Some grow more quickly than others.

- The eyes open wide.
- Toenails begin to form.
- Blood cells are made in the bone marrow.
- Fat begins to be put on under the skin.
- The crown-rump length is around 270 mm (nearly 11 inches).
- The fetus weighs 1300 grams (almost 3 pounds).

29-30 Weeks after Conception
(31-32 Weeks after the last menstrual period)

More fat is put on under the skin. The skin thickens. The fetus starts to look more like a newborn baby. The lanugo hairs on the face go away.

- The pupils of the eyes react to light.
- The crown-rump length is around 280 mm (just over 11 inches).
- The fetus weighs around 1700 grams (about 3-3/4 pounds).

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31-32 Weeks after Conception
(33-34 Weeks after the last menstrual period)

Fat is still put on under the skin as the fetus grows. The lungs keep growing and making more surfactant.

- The ear holds it shape when moved.
- Fetal muscle tone increases.
- The crown-rump length is around 300 mm (just under 1 foot).
- The fetus weighs around 2100 grams (over 4-1/2 pounds).

33-34 Weeks after Conception
(35-36 Weeks after the last menstrual period)

The lungs and the nervous system keep growing. Also, more fat is put on under the skin. The fetus begins looking chubby. Hair on the head begins looking normal.

- Testes in male fetuses start to move from the abdomen into the scrotum.
- The labia (vaginal lips) in female fetuses begin to cover the clitoris.
- The average crown-rump length is over a foot.
- The fetus weighs around 2500 grams (over 5 pounds).

35-36 Weeks after Conception
(37-38 Weeks after the last menstrual period)

In almost all cases, fetal lungs are mature at this point. Lanugo hairs are almost all gone. The fetus may be born now or may stay in the womb while more fat is put on under the skin.

37-38 Weeks after Conception
(39-40 Weeks after the last menstrual period)

This is full term in pregnancy. Most babies are born during this time. The average crown-rump length is 360 (over 14 inches). The total length counting the legs is about 20 inches. On average, a full-term baby weighs 3400 grams (or 7-1/2 pounds).

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IV. Risks of Pregnancy

All pregnancies have some risk of complications. These risks are affected by the pregnant woman's health and the prenatal care she receives.

According to the Centers for Disease Control, between 1991 and 1999 there were 11.8 overall pregnancy related deaths per 100,000 live births in the United States. Race was strongly linked with pregnancy-related deaths; black women were 3-4 times more likely to die from complications of pregnancy than were white women.

One problem that may result in serious injury is pre-eclampsia. Symptoms include high blood pressure, protein in the urine, and swelling. Pre-eclampsia occurs in 5% of all pregnancies. The risk is higher with the first baby. Pre-eclampsia may cause maternal stroke, bleeding disorders, kidney damage, heart disease and seizures.

Infection is another big cause of problems in pregnancy and childbirth. The infection is usually only in the pelvic organs. It can become very serious if it enters the blood stream. The infection would then require intensive treatment.

Premature labor occurs in about 12% of pregnancies. Treatment sometimes requires long hospital stays. Medicine used to stop premature labor can cause fluid in the lungs and heart failure. Premature infants may have serious health problems. The risk of complications for premature infants is lower as the pregnancy nears 9 months.

Pregnant women can develop temporary diabetes (gestational diabetes). This increases the risk of difficult delivery and cesarean delivery. Infants whose mothers have gestational diabetes have a higher risk of medical complications and death. The risk of gestational diabetes is higher if you are overweight or have family members with diabetes.

About 32% of all women in the USA will need an operation to deliver the baby (Cesarean delivery).

Hemorrhage (too much bleeding) can occur either before or during delivery. It is sometimes bad enough to require a blood transfusion and/or cause a woman to need a hysterectomy (removal of uterus).

Difficult deliveries can cause damage to the bladder and rectum. Surgery may be needed to fix this damage.

Anesthesia, which has some risks, may be needed for difficult deliveries, Cesarean sections and emergencies.

Pregnancy is usually a safe, natural event, but problems can arise. Talking with a doctor may help you learn your risks.

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V. Methods of Abortion

The choice of the method of abortion depends on the stage of the pregnancy and other patient factors. In general, the further along the pregnancy, the more complicated and difficult the abortion method.

An ultrasound exam may be needed to check the stage of pregnancy before an abortion can be done.

A. Early Medical Abortion (Early Pregnancy, up to 7-9 weeks gestation)

A woman in very early pregnancy may have the option of an abortion that uses medicine instead of a surgical abortion. The woman must see a health care provider to get the medicine. She will need to see the health care provider at least one more time to make sure the medication abortion is complete. If it is not, she may need to have a surgical abortion. If a woman chooses to have a medication abortion, it is very important that she take the medicine exactly as the health care provider tells her to take it.

B. Suction Curettage (Aspiration) (Early Pregnancy 6-14 weeks)

The vagina is cleaned with a liquid soap. A shot to numb the cervix is given. Then the cervix is dilated (opened by stretching). A tube attached to a suction machine is put into the uterus. The uterus is then emptied by suction. Next, a tool called a "curette" is used to scrape the wall of the uterus. This removes any products of pregnancy (fetus and afterbirth) that remain in the uterus.

After the abortion, a woman with Rh-negative blood will be given a shot of immune globulin. This prevents blood type problems in future pregnancies. Antibiotics may be ordered to prevent infections of the uterus. Other medicines may be used to reduce bleeding. This method takes about 15-30 minutes.

C. Dilation and Evacuation (Early Pregnancy 12-24 weeks)

This is the most common method used after 12 weeks of pregnancy. The vagina is cleaned with a liquid soap. The cervix is usually prepared by putting natural sponges called "laminaria" into the opening of the cervix. They soak up moisture and swell. This causes the slow stretching and opening of the cervix over a period of hours. In some cases, other methods may be used at the time of the procedure to stretch and open the cervix. A numbing shot along with intravenous (I.V.) medicine or a general anesthetic may be used to control pain. When the cervix has been opened, tools and suction tubes are put into the uterus to remove the products of pregnancy.

After the abortion, a woman with Rh-negative blood will be given a shot of immune globulin. This prevents blood type problems in future pregnancies. Antibiotics may be ordered to prevent infections of the uterus. Other medicines may be used to reduce bleeding. This method takes about 45 minutes.

D. Induction of Labor (Advanced Pregnancy)

Emptying of the uterus by induction of labor is usually done in the hospital. First, the cervix must be prepared by making it softer. Several methods can be used. Laminaria may be placed into the opening of the cervix. They soak up moisture and swell. This causes the slow stretching and opening of the cervix over a period of hours. Or prostaglandin medicines may be put into the vagina for a number of hours.

After the cervix is softened, labor is started (induced). Several medicines such as prostaglandin or oxytocin can be used to start contractions. Or labor may be started by injecting medicine through the abdominal and uterine walls into the "bag of waters" (amniotic sac). In this case, a shot to numb the skin is given. Most women who are induced deliver in 10-20 hours.

If the dilation and evacuation method of abortion is used, there is almost no chance the pregnancy will survive. Later in pregnancy, chemicals may be injected into the uterus before the abortion is performed. In this case, the pregnancy will not survive the abortion. If labor induction is used, there is a slight chance that the fetus could live for a short time. The chance of the fetus living outside the uterus increases with the length of the pregnancy.

Sometimes all tissue is not emptied out of the uterus by the labor process. If not, it may be removed by using special tools to clean the walls of the uterus. These tools are inserted into the uterus through the vagina. A numbing shot along with I.V. medicine or a general anesthetic may be used to control pain. After the uterus is empty, I.V. medicine may be used for a time to control bleeding.

After the abortion, a woman with Rh-negative blood will be given a shot of immune globulin. This prevents blood type problems in future pregnancies. Antibiotics may be ordered to prevent infection of the uterus. Other medicines may be used to reduce bleeding.

E. Hysterotomy / Cesarean Delivery (Advanced Pregnancy - after 24 weeks gestation)

In rare cases where the induction method fails or cannot be used, a surgical method called "hysterotomy" must be used. "Hysterotomy" means to cut open the uterus. It is like a Cesarean delivery and has the same risks.

After the abortion, a woman with Rh-negative blood will be given a shot of immune globulin. This prevents blood type problems in future pregnancies. Antibiotics may be ordered to prevent infection of the uterus. Other medicines may be used to reduce bleeding.

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VI. Risks of Abortion Procedures

Serious problems with legal abortions are rare. The risk of a woman dying from a legal abortion is slight. The abortion method used, the length of the pregnancy, and the age of the woman affect this risk.

According to the Centers for Disease Control and Prevention (CDC) 2002 data, the death rate of women having legal abortions was 0.7 abortion related deaths per 100,000 legal induced abortions. Data from 2006-2008 suggest the death rate from abortions is even lower than 0.7. From 2006-2008, 7 deaths that were in some way connected to a legal abortion, were reported by the CDC. However, CEC has not published a death rate since 2002.

While women may experience temporary feelings of sadness or stress when making the difficult decision to terminate a pregnancy, the vast majority of recent studies indicate that women usually feel relief and are satisfied with the decision to have an abortion, even many years later.

When Performed During the First Three Months

Abortions performed during the first three months of pregnancy are safer and easier than those performed after the first three months. There may be some minor discomfort, either during a surgical abortion or medication abortion, much like menstrual cramps.

When Performed During the Second Three Months

Abortions performed during the second three months of pregnancy are more complicated than those during the first trimester. While they are still safe, there is more of a chance of problems following a second trimester abortion than there is with a first trimester abortion. Most women experience some discomfort during the procedure and have some cramping afterwards.

After a First or Second Trimester Procedure

On rare occasions a woman may experience some problems following an abortion. These may include:

- An incomplete abortion, which may require the woman to have a surgical abortion
- An infection in the female organs
- Heavy bleeding, or
- Damage to the uterus or cervix

It is improtant to contact your healthcare provider if you:

- Start to run a fever
- Experience severe pain or tenderness in your pelvic area, lower abdomen, and/or lower back
- Experience very heavy vaginal bleeding, or
- Notice a very bad odor from your vagina

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Your healthcare provider will explain:

The risks of the type of abortion you choose

Possible problems you may experience during and after the abortion

When you should call or come back to the clinic if you experience problems after the abortion.

Third Trimester (Late) Abortions

In the last three months of pregnancy, an abortion is done only to save the life or health of the woman. According to South Carolina law, in the last three months of pregnancy, an abortion is done only with the pregnant woman's consent.

If she is married, her husband must also consent.

It must be done only in a certified hospital.

Also the woman's physician and a second physician must state in writing that the abortion is needed based on their best medical judgment to save the life or health of the woman. The second physician cannot be related to or work in private practice with the woman's physician.

In case of an abortion to preserve the woman's mental health, this reason must also be stated in writing by a psychiatrist. The psychiatrist cannot be related to or work in private practice with the woman's physician.

Late abortions performed in South Carolina are rare.

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If you would like to order copies of "The South Carolina Directory of Services for Women, Children & Families," or "Embryonic & Fetal Development," please complete the order form found below. You can fax the form to (803) 898-3476 or mail it to SC DHEC's Educational Resources Center • 2600 Bull Street • Columbia, SC 29201. Please allow two weeks for mailing.

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